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in T and ω, the final values were derived by Professor LEUSCHNER'S Differential Formulæ (*Beiträge zur Kometenbahnbestimmung*, pages 28–29).

ELEMENTS.

$$T = \text{September } 20.073795 \text{ Gr. M. T.}$$

$$\left.\begin{array}{rl} i = & +22^\circ\ 30'\ 27''.3 \\ \Omega = & 95\ \ 51\ \ 25\ .2 \\ \omega = & 4\ \ 35\ \ 31\ .9 \end{array}\right\}\ 1899.0$$

$$\log q = 0.358758$$

$$\text{O} - \text{C}:\ \Delta\lambda \cos\beta = -1''.5;\ \Delta\beta = -1''.7$$

CONSTANTS TO THE EQUATOR OF 1899.0.

$$\begin{array}{l} x' = [.3247374] \sin (190^\circ\ 55'\ 42''.00 + v) \sec^2 \tfrac{1}{2} v \\ y' = [.3334251] \sin (109\ \ 15\ \ 29\ .25 + v) \sec^2 \tfrac{1}{2} v \\ z' = [.0621375] \sin (\ 56\ \ 12\ \ 13\ .61 + v) \sec^2 \tfrac{1}{2} v \end{array}$$

UNIVERSITY OF CALIFORNIA, }
STUDENTS' OBSERVATORY, } July 11, 1899.

(THIRTY-SIXTH) AWARD OF THE DONOHOE COMET-MEDAL.

The Comet-Medal of the Astronomical Society of the Pacific has been awarded to Dr. LEWIS SWIFT, Director of the Lowe Observatory, for his discovery of an unexpected comet on March 3, 1899.

The Committee on the Comet-Medal,

J. E. KEELER,
WM. M. PIERSON,
CHAS. BURCKHALTER.

July 18, 1899.

PLANETARY PHENOMENA FOR SEPTEMBER AND OCTOBER, 1899.

BY MALCOLM MCNEILL.

SEPTEMBER.

Mercury is a morning star at the beginning of the month, rising nearly an hour and a half before sunrise. It comes to greatest west elongation on September 5th, and thereafter approaches the Sun, coming to superior conjunction on September 30th. It rises at least an hour before sunrise until the middle of the month.

Venus passes superior conjunction with the Sun on September 16th, and changes from a morning to an evening star; but as its greatest distance from the Sun during the month is only a little more than 4°, it will remain out of sight to the naked eye.

Mars is still an evening star, but is drawing nearer to the Sun, and at the end of the month it sets only a little more than an hour after sunset. It will be a very difficult object to see unless the horizon is exceptionally clear and free from haze. It moves 18° eastward and 7° southward among the stars in *Virgo*, and on September 8th is in conjunction with *Spica*, α *Virginis*, the planet being 2° north of the star.

Jupiter is also in the southwestern sky in the evening, higher up than *Mars*. It is in the constellation *Libra*, and moves 5° eastward and 2° southward; at the end of the month it is 2° west and 1° north of α *Libræ*.

Saturn is also in the southwestern quarter of the sky, in the evening higher up and nearer the meridian than *Jupiter*. It is still in the southern part of *Ophiuchus* between *Scorpio* and *Sagittarius*, and moves about 1° eastward during the month. It is about 12° east and north of *Antares*, α *Scorpii*.

Uranus is also in the same quarter of the heavens, and lies between *Saturn* and *Jupiter* in the constellation *Scorpio*, about 3° east and 1½° south of the second star in the constellation, β *Scorpii*. It is, however, so low after the twilight has disappeared that it will not be easy to see it without a telescope.

Neptune rises before midnight, and is on the border of the constellations *Taurus* and *Gemini*.

OCTOBER.

Mercury is an evening star throughout the month, but does not get far enough away from the Sun for naked-eye observation. It is in close conjunction with *Venus* on October 10th, and passes *Jupiter* at a little greater distance on October 25th, but its dull light will be lost in the strong twilight.

Venus is an evening star, and increases its distance from the Sun a little during the month; so that by the end it sets a little more than half an hour after sunset. As it is at nearly its maximum distance from the Earth in miles, its brightness will be as small as possible, and it will be scarcely possible to see it without a telescope. It is in conjunction with *Jupiter* on October 29th, the nearest distance of the planets being a little more than the Sun's apparent diameter. It also has a very close conjunction with α *Libræ* on October 26th.

Mars is also in the same neighborhood a little farther from the Sun, and therefore better situated for observation; but it is now so faint that it cannot be detected in the strong twilight without a telescope. Toward the close of the month it sets an hour after sunset.

Jupiter is very close to the Sun, in conjunction with *Mars* on October 11th, with *Mercury* on October 25th, and with *Venus* on October 29th; but it sets so soon after sunset that it probably cannot be seen easily after the middle of the month.

Saturn is not far away from the others. It sets also in the early evening, but two hours later than *Jupiter;* so it will not be difficult to see it. It is still in the same neighborhood among the stars, in the southern part of *Ophiuchus* and moving toward the western part of *Sagittarius.*

Uranus is between *Saturn* and *Jupiter*, rather nearer *Saturn.* It is too faint to be seen after twilight ends, on account of the low altitude it then has.

Neptune rises in the east at about the time when *Saturn* sets.

PHASES OF THE MOON, P. S. T.

		H. M.		H. M.
New Moon,	Sept. 4,	7 33 P. M.	Oct. 4,	11 14 A. M.
First Quarter,	Sept. 12,	1 49 P. M.	Oct. 11,	10 10 P. M.
Full Moon,	Sept. 19,	4 31 A. M.	Oct. 18,	2 5 P. M.
Last Quarter,	Sept. 26,	7 3 A. M.	Oct. 26,	1 40 A. M.

THE SUN.

1899.	R. A. H. M.	Declination. ° ′	Rises. H. M.	Transits. H. M.	Sets. H. M.
Sept. 1.	10 41	+ 8 16	5 32 A.M.	12 0 M.	6 28 P.M.
11.	11 18	+ 4 33	5 42	11 57 A.M.	6 12
21.	11 54	+ 0 41	5 51	11 53	5 55
Oct. 1.	12 30	− 3 12	6 1	11 50	5 39
11.	13 6	− 7 3	6 11	11 47	5 23
21.	13 44	− 10 44	6 22	11 45	5 8
31.	14 22	− 14 8	6 32	11 44	4 56
			MERCURY.		
Sept. 1.	9 35	+ 13 23	4 7 A.M.	10 53 A.M.	7 39 P.M.
11.	10 20	+ 11 48	4 19	10 59	7 39
21.	11 27	+ 5 36	5 7	11 26	5 45
Oct. 1.	12 33	− 2 9	6 2	11 55	5 48
11.	13 34	− 9 35	6 48	12 15 P.M.	5 42
21.	14 33	− 16 2	7 30	12 34	5 38
31.	15 32	− 21 6	8 9	12 54	5 39

Venus.

Sept.	1.	10 29	+ 11 2	5 9 A.M.	11 47 A.M.	6 25 P.M.
	11.	11 15	+ 6 22	5 32	11 54	6 16
	21.	12 1	+ 1 24	5 55	12 0 M.	6 5
Oct.	1.	12 46	— 3 41	6 18	12 6 P.M.	5 54
	11.	13 33	— 8 38	6 42	12 13	5 44
	21.	14 20	— 13 17	7 6	12 21	5 36
	31.	15 9	— 17 24	7 32	12 31	5 30

Mars.

Sept.	1.	13 3	— 6 29	8 43 A.M.	2 21 P.M.	7 59 P.M.
	11.	13 27	— 9 4	8 37	2 6	7 35
	21.	13 52	— 11 35	8 31	1 52	7 13
Oct.	1.	14 18	— 13 59	8 26	1 38	6 50
	11.	14 45	— 16 15	8 23	1 26	6 29
	21.	15 13	— 18 20	8 19	1 15	6 11
	31.	15 43	— 20 10	8 16	1 4	5 52

Jupiter.

Sept.	1.	14 17	— 12 39	10 17 A.M.	3 34 P.M.	8 51 P.M.
Oct.	1.	14 38	— 14 28	8 47	1 57	7 7
Nov.	1.	15 4	— 16 26	7 18	12 21	5 24

Saturn.

Sept.	1.	17 5	— 21 34	1 39 P.M.	6 22 P.M.	11 5 P.M.
Oct.	1.	17 10	— 21 46	11 47 A.M.	4 29	9 11
Nov.	1.	17 21	— 22 3	9 57	2 38	7 19

Uranus.

Sept.	1.	16 9	— 20 54	12 41 P.M.	5 26 P.M.	10 11 P.M
Oct.	1.	16 12	— 21 4	10 47 A.M.	3 32	8 17
Nov.	1.	16 19	— 21 20	8 52	1 36	6 20

Neptune

Sept.	1.	5 46	+ 22 9	11 46 P.M.	7 5 A.M.	2 24 P.M.
Oct.	1.	5 47	+ 22 8	9 49	5 8	12 27
Nov.	1.	5 46	+ 22 7	7 46	3 5	10 24 A.M.

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Off right-hand limb as seen in an inverting telescope.)

			H. M.				H. M.
III, D,	Sept.	1.	4 22 P.M.	I, R,	Oct.	7.	5 54 P.M.
III, R,		1.	5 46	III, D,		14.	4 15
II, R,		2.	6 12	III, R,		14.	5 10
I, R,		21.	7 36				